Appendix 3.11D
Bat Study

COPPERHEAD
ENVIRONMENTAL CONSULTING

Indiana Bat and Northern Long-Eared Bat Presence/Probable Absence Survey for the National Geospatial-Intelligence Agency Environmental Impact Statement at the Mehlville Site, St. Louis County, Missouri

Prepared For:
U.S. Army Corps of Engineers, Kansas City District

And

CH2M HILL, Inc.

Submitted To:

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17 August 2015

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PROJECT LOCATION & DESCRIPTION

The Mehlville Site (13045 Tesson Ferry Rd, St. Louis, Missouri) is approximately 100 acres in size (including 30 forested acres) and contains a 2 story office building and associated parking. This site is being considered for purchase by the U.S. Government and development plans could include disturbance to the entire site and removal of the remaining 30 forested acres. Two species of protected bats, the Indiana bat and northern long-eared bat, are known to occur in St. Louis County. Because approximately 30 acres of forested habitat will be permanently removed with project development, the U.S. Fish and Wildlife Service (USFWS) requested that a bat survey be conducted as part of Section 7 consultation in order to determine potential impacts to these species. Therefore, Copperhead Environmental Consulting, Inc. (Copperhead) was subsequently contracted by the U.S. Army Corps of Engineers, Kansas City District through CH2M to conduct a mist-net survey of the project site to document presence or probable absence of Indiana and northern long-eared bats.

Prior to commencement of the mist-net survey, Copperhead submitted a Study Plan detailing methodology and level of effort to USFWS Missouri Ecological Services Field Office. Concurrence on the Study Plan was received on 13 July 2015. Mist-netting was conducted under Copperhead's USFWS Federal Fish and Wildlife Permit #TE070584-12 and Missouri Department of Conservation Wildlife Collector's Permit #16565.

SPECIES DESCRIPTION AND LIFE HISTORY

Indiana Bat

The Indiana bat was first described by Miller and Allen in 1928. The species formally attained endangered species status on March 11, 1967 and is listed as endangered by the USFWS. Its distribution includes most of the eastern United States from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida (Barbour and Davis 1969, Hall 1981, Kurta and Kennedy 2002, USFWS 2007).

Indiana bats use caves and abandoned mine portals as hibernacula. During winter, they have very specific hibernation requirements and occupy areas that maintain a narrow temperature and humidity range. As such, very few caves provide adequate microclimate for these bats (USFWS 2007). After hibernation, females leave the hibernacula and fly to nursery sites to raise their young. Although some males may leave with the females, others stay in or near the hibernacula throughout the summer months (Barbour and Davis 1969, Gumbert 2001).

At their summer grounds, Indiana bats typically live under the exfoliating bark of trees (Kurta and Kennedy 2002). Indiana bats exhibit fidelity for summer roost areas and even specific trees from year to year (Garner and Gardner 1992, Gumbert et al. 2002). Early studies indicated that floodplain forests were the significant habitat for Indiana

bats (Humphrey et al. 1977), but recent studies indicate that this species also uses upland habitats (Kiser and Elliott 1996, MacGregor et al. 1999, Gumbert 2001, Britzke et al. 2003, Sewell et al. 2006). Most known maternity roosts have been located in or near wooded areas where some light gap is present allowing full or partial solar exposure to the roost site. Each adult female within a maternity colony bears one young in May or June. Maternity colonies typically roost under the exfoliating bark of dead or live trees, and to lesser extent, tree cavities (Gardner et al. 1991, Kurta and Williams 1992, Callahan 1993). In rare cases, Indiana bats have also been found using human made structures as maternity roosts (Butchkoski and Hassinger 2002, ESI 2006).

Indiana bats leave their maternity grounds mid-August to September and migrate toward their hibernacula where they swarm near cave openings until they enter hibernation (Barbour and Davis 1969). Mating occurs in the fall (with a limited amount occurring in the spring) and females store sperm through hibernation until they inseminate themselves or not in the spring prior to spring migration (Barbour and Davis 1969).

Northern Long-eared Bat

Northern long-eared bats can be distinguished from other *Myotis* species in their range by their longer ears and longer more pointed tragus. Forearm lengths range from 32 to 39 millimeters (Barbour and Davis 1969). The northern long-eared bat has long been considered to be a common bat within forests throughout most of its range. However with the introduction of white-nose syndrome (WNS) and the subsequent population decline, this may no longer be true.

Northern long-eared bats spend the summer months in forested areas. They are acrobatic fliers and can fly and forage under the forest canopy and in relatively dense vegetative clutter. Maternity colonies of this species usually occur under sloughing bark of trees (Lacki and Schwierjohann 2001), although some use of bat boxes and human made structures like shutters has been documented (Broders and Forbes 2004). Maternity colonies vary in size from six to 60 individuals. During the maternity season, males typically roost alone (BCI 2001). Little is known about northern long-eared bat hibernation. Though they do occur in caves during winter, they are rarely found in high numbers and are also believed to hibernate outside of caves and mines.

As with other *Myotis* in their range, northern long-eared bats mate in the fall during swarming prior to hibernation and exhibit delayed fertilization until emergence in the spring. Pups are born 50 – 60 days after emergence and become volant in under a month. Unlike most other bat species, there is no close synchronization of births in northern long-eared bat maternity colonies (BCI 2001). In late summer, maternity colonies begin to break up and both sexes begin to move to swarming and hibernation sites.

METHODS

Site Selection/Mist Netting

Based on the size of the project area, amount of forested habitat expected to be impacted (approximately 30 acres [ac]), and USFWS guidelines for mist-net surveys of non-linear projects (9 net nights / 123 ac), one mist-net site was surveyed to cover the proposed project. Location of the mist-net site was chosen after Copperhead biologists conducted field reconnaissance of the entire project area (Table 1, Figure 1). Photographs of the mist-net site are provided in Appendix A.

Table 1. Mist-net site location for the Mehlville Site, St. Louis County, Missouri.

Site No.	Description	Dates (2015)	County	Quad	Latitude	Longitude
MV1	Small access roads in woodlot behind MetLife Ind. Park	1 - 3 August	St. Louis	Maxville	38.49227	-90.3894

Mist-net surveys were implemented in accordance with guidelines outlined in the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2015), specifically using mist-net surveys to determine presence/probable absence. Mist-nets were set to maximize coverage of flight paths used by bats along suitable travel corridors, foraging areas, and/or drinking areas. Placement of mist-nets was based on the extent of canopy cover, presence of an open flyway, and forest conditions near the site. Actual location and orientation of each net was determined in the field by qualified biologists. The mist-net site consisted of a total of three net locations monitored for three nights, for a total of nine net nights. Nets were deployed at sunset each night, left open for at least five hours, checked every 10 minutes, and disturbance near the nets was kept to a minimum. Weather data, including temperature, wind speed, and cloud cover was recorded for each site on an hourly basis to ensure compliance with the mist-netting guidelines (i.e., temperature during survey greater than 50°F).

Bats were live-caught in mist-nets and released unharmed near the point of capture. Biological and morphometric data, i.e., species, sex, age class, reproductive condition, mass, and forearm length were recorded on data sheets for each individual captured. In addition, the height, and the specific net set of capture were recorded for each bat. Processing of bats was completed within 30 minutes from the time the bat was removed from the net.

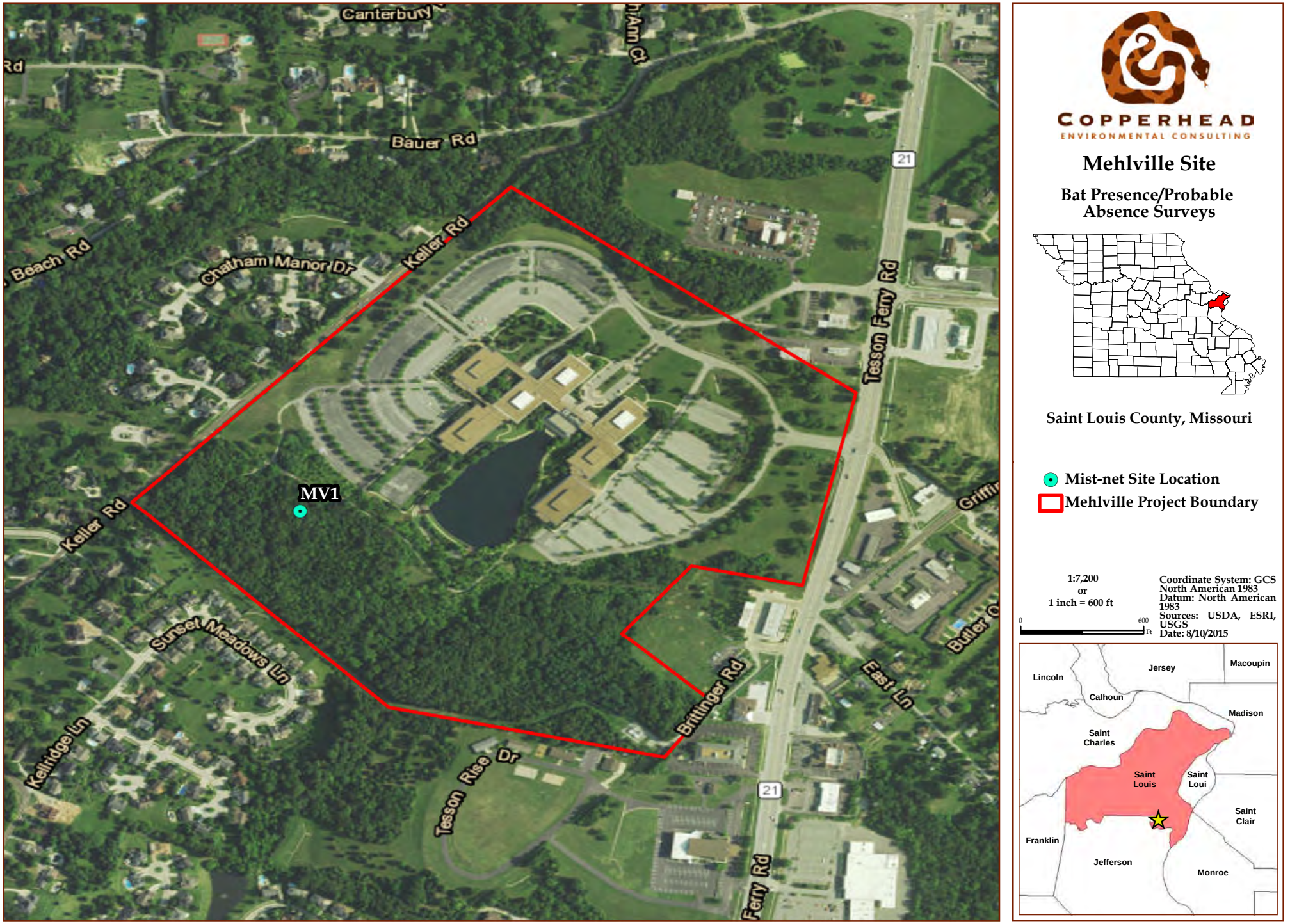

Figure 1. Mist-net site location for the proposed Mehlvile Site, St. Louis County, Missouri.

White-Nose Syndrome Protocol

In an effort to minimize the transmission of WNS between captured bats, all netting and field activities followed the most recent guidelines established by USFWS. All hard, non-porous netting equipment was sanitized with a Lysol® IC solution prior to arrival and after each survey night; all other equipment was submersed in hot water (122°F) for a minimum of 20 minutes. Individual bats were kept in unused paper bags while waiting processing. Disposable latex gloves were worn over sanitized handling gloves and changed following the handling of each bat. All non-disposable equipment, e.g., pesola scales, rulers, calipers, etc., coming into contact with bats was sanitized immediately following the handling of each bat. Bats were evaluated for potential WNS infection through wing scoring following the "Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome" (Reichard and Kunz 2009).

RESULTS

Bat Captures

A total of two bats representing two species were captured during mist-net survey efforts, including 1 *Eptesicus fuscus* (EPFU) and 1 *Lasiurus borealis* (LABO; Table 2). No Indiana or northern long-eared bats were captured. Completed bat capture data sheets are provided in Appendix B.

Table 2. Summary of bat captures by species, age, sex, and reproductive condition for the proposed Mehlville Site, St. Louis County, Missouri.

Species	Adult Male		Adult Female				Juvenile		Total
	NR	SCR	PG	L	PL	NR	Male	Female	
Eptesicus fuscus	1	-	-	-	-	-	-	-	1
Lasiurus borealis	-	-	-	-	-	-	1	-	1
Total	-	-	-	-	-	-	-	-	2

NR = non reproductive; SCR = scrotal; L = lactating; PG = pregnant; PL = post lactating

Habitat

Habitat within the project boundary consisted of deciduous forest, a large pond, and open/landscaped habitat with the area immediately surrounding the site consisting of residential and commercial development. Forested habitat was dominated by immature/mature box elder (*Acer negundo),* black locust *(Robinia pseudoacacia)*, slippery elm (*Ulmus rubra*), sassafras (*Sassafras albidum*), and hackberry (*Celtis occidentalis*). In general, forest structure was considered moderate due to the presence of mature trees, diverse age classes, and openings in the forest understory and canopy that may provide suitable foraging habitat. Potential roosting habitat was considered moderate due to the presence of snags with sloughing bark, cavities, and knot holes. However, snags were not abundant and solar exposure was limited. Water resources that provided

potential foraging and drinking sites consisted of a large pond directly behind the office complex. Although suitable foraging and roosting habitat was present, the project site was surrounded by residential and commercial development and lacked connectivity to larger, unfragmented forested areas. In addition, the forest understory was dominated by bush honeysuckle (*Lonicera* sp.) and was extremely cluttered, thereby limiting foraging and commuting opportunities for roosting bats.

CONCLUSIONS

The mist-net survey was conducted with the appropriate level of effort (9 net nights over 3 calendar nights) and under the appropriate weather conditions to determine presence/probable absence of Indiana and northern long-eared bats during the maternity season (USFWS 2015).

No Indiana or northern long-eared bats were captured during the survey, indicating these species are not likely present within the project area during the maternity season or are present in numbers too low to be detected by currently approved USFWS protocols. Based on negative results of the mist-net survey and the type of habitat found at and surrounding the site, project development is not likely to impact summer populations of Indiana or northern long-eared bats.

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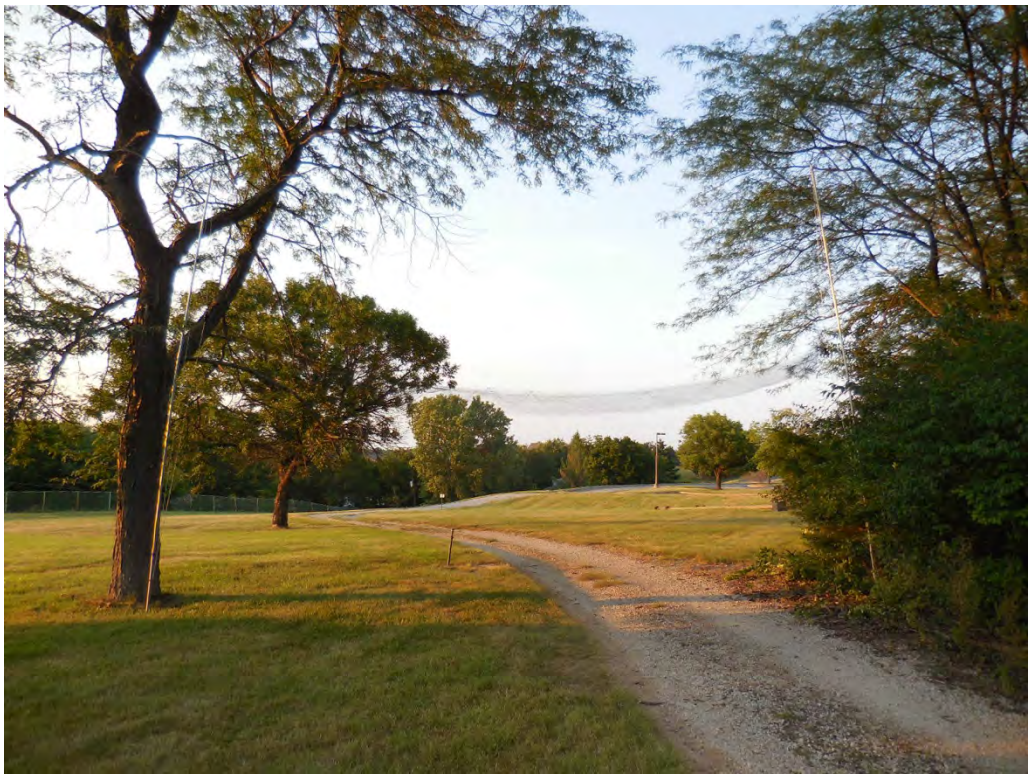
APPENDIX A

Mist-Net Site Photographs

Site MV1 – Net A (1, 2, 3 August)

Site MV1 – Net B (1, 2 August)

Site MV1 – Net C (1, 2 August)



Site MV1 – Net D (3 August)

Site MV1 – Net E (3 August)

APPENDIX B

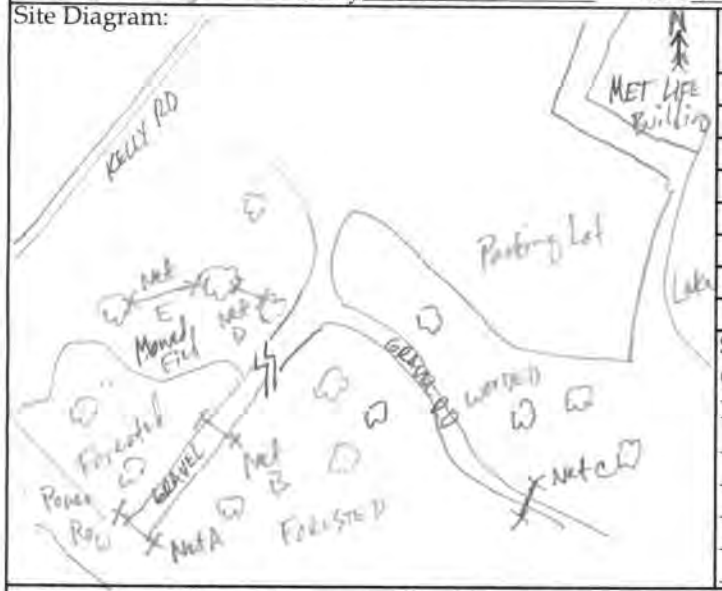
Bat Capture and Habitat Data Sheets

Mist Net Site Habitat Sheet Site No. MV1 Project No./Name #402 / Melville Site Bats Mo Date 8/1/2015

Lat/Lon ; UTM: (N)/E 36.49227 (W)/N 90.38935 Zone WGS84 Observers J. Hawkins, R. Oberholzer

Datum: NAD83 County St. Louis State MO Quad Maxville

Site Diagram:



Net	Height (m)	Length (m)	Dates
A	6	6	8/1, 8/2, 8/3
B	6	9	8/1, 8/2
C	6	6	8/1, 8/2
D	6	9	8/3
E	6	6	8/3
F			

Site Photographs
Camera: Nikon S6800
Photo Log:
Net A #0674
Net B #0675
Net C #0678
Net D #0680
Net E #0682

Dominant Vegetation

1. Acer negundo
2. Robinia pseudoacacia
3. Lonicera sp.
4. Sassafras albidum
5. Morus rubra
6. Rosa multiflora

Net Set by Habitat

Habitat	A	B	C	D	E	F
River						
Stream						
Pond						
Corridor	X	X	X			
Cave						
Mine						
Forest Gap		X				
Other Edge				X	X	

Indiana Bat Habitat Characterization (Choose appropriate score for each habitat characteristic)

2 **Roost habitat**: **1. Poor**: No or few snags >= 5" DBH with sloughing bark or other usable roost features (cracks, crevices, etc)
2. Moderate: Snags with sloughing bark or other roost features present 5-15 inch DBH within 1000 feet of forested areas.
3. Optimal: Snags with sloughing bark or other roost features present >15 inch DBH within 1000 feet of forested areas.

3 **Water Resources**: **1. Poor**: bat drinking resources not present at the site.
2. Moderate: Ephemeral or intermittent streams or ponded areas present but too cluttered to allow many bats to drink easily or simultaneously. No corridors, openings or canopy gaps allow bats easy access to the resource.
3. Optimal: Streams or ponds (including road ruts) present that appear to offer drinking resource throughout the majority of the summer. Flyways to resources are available.

2 **Forest Structure**: (if hardwoods are absent or nearly absent or if stand is monoculture, area automatically qualifies as a 1: poor).
1. Poor: Habitat even aged and young. Trees smaller than 5 inch DBH. Understory growth cluttered and restricts flying/foraging
2. Moderate: some diversity in age of trees in the stand. Trees 5 to 15 inches present. Understory clutter dominant but not ubiquitous. Trees greater than 15" DBH may be present but rare.
3. Optimal: Mature forest. Diverse age classes of trees present. Trees > 15 inch DBH frequent. Varying tree height and treefalls allow for frequent small openings and gaps that facilitate bat foraging.

1 **Land Cover**: **1. Poor**: Square kilometer surrounding site predominantly un-forested. Few mature trees present not connected to other areas of trees.
2. Marginal: Trees present in the form of small woodlots and wooded fence rows. Little connection to adjacent forested areas.
3. Optimal: Area is largely forested. Wooded stands are connected to other wooded stands via wooded stream, fence row, or other wooded corridor.

8 **Total Habitat Score** (Should be between 4 & 12) Net E: N38.49321, W90.38983

Comments: Net A Cont: N38.49157, W90.39066 Net C: N38.49250, W90.38902 Net B: N38.49212, W90.39052 Net D: N38.49322, W90.38964

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Mist Netting Data Form

Site No. MV1 Project No./Name #402 / USACE ICC NGA Bat Survey Date 8/1/2015

Site Location Small access road running through woodlot behind MetLife Int. Park

County St Louis State MO Time Up 2113 Time Down 0113

Lat/Lon ; UTM: (N)/E 38.49227 (W)/N 90.38935 Zone ____ Datum WGS84 Observers J. Hawkins, R. Oberholzer

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Time	Species	Age	Sex	Repr.	Mass (g)	FA (mm)	Net	Height (m)	WDI	G/H/B/T	Band# Type___	Freq. ____
1													
2													
3													
4													
5		NO BATS											
6													
7													
8		CAPTURED											
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
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24													
25													
26													
27													
28													
29													
30													

Acoustic Survey: Unit type N/A Unit #_____ Date_____ Start time_____ Stop time_____

Date_____ Start time_____ Stop time_____

Date_____ Start time_____ Stop time_____

Weatherproofing_____ Coordinates_____

Comments:

Moon Phase % 96 Wax / (Wane)

	Rise	Set
Sun	0602	2013
Moon	2059	0728

Time	Temp (F)	Sky	Wind	No. Bats
2000	86	2	0	0
2100	77	2	0	0
2200	73	2	0	0
2300	73	2	0	0
0000	72	2	0	0
0100	70	0	0	0

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

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Mist Netting Data Form

Sheet 1 of 2

Site No. MVI Project No./Name #402 / Mehlville Site Bats, MO Date 2 August 2015

Site Location Small access roads running through woodlot behind Metlife Business Park

County St Louis State MO Time Up 2017 Time Down 0112 central

Lat/Lon ; UTM: (N)/E 38.49227 (W)/N 90.38935 Zone ____ Datum WGS84 Observers J. Hawkins, R. Oberholzer

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Time	Species	Age	Sex	Repr.	Mass (g)	FA (mm)	Net	Height (m)	WDI	G/H/B/T	Band# Type	Freq.
1													
2													
3													
4		NO BATS											
5													
6													
7		CAPTURED											
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
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19													
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25													
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27													
28													
29													
30													

Species Abbreviations: Corynorhinus rafinesquii (CORA); Corynorhinus t. virginianus (COVI); Eptesicus fuscus (EPFU); Lasiurus borealis (LABO); Lasiurus cinereus (LACI); Lasiurus seminolus (LASE); Lasionycteris noctivagans (LANO); Myotis austroriparius (MYAU); Myotis grisescens (MYGR); Myotis leibii (MYLE); Myotis lucifugus (MYLU); Myotis septentrionalis (MYSE); Myotis sodalis (MYSO); Nycticeius humeralis (NYHU); Perimyotis subflavus (PESU); Tadarida brasiliensis (TABR)

Other Abbreviations: Male: M; Female: F; Pregnant: P; Lactating: L; Post Lactating: PL; Scrotal: S; Non Repro: NR

Moon Phase %95 **Wax / (Wane)**

hrs (central)	Rise	Set
Sun	0603	2012
Moon	2139	0939

Time	Temp (F)	Sky	Wind	No. Bats
2000	88	0	0	0
2100	79	0	0	0
2200	75	0	1	0
2300	73	1	1	0
0000	73	2	1	0
0100	75	2	1	0

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

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Mist Netting Data Form

Sheet 2 of 2

Site No. MV1 Project No./Name 402 / Melville site, Bats, St. Louis, MO Date 3 Aug 2015

Site Location Small access roads running through woodlot behind MetLife Industrial Park

County St. Louis State MO Time Up 2011 Time Down 0111

Lat/Lon ; UTM: N/E 38.49227 W/N -90.38935 Zone ____ Datum ____ Observers J. Hawkins, R. Oberholzer

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Time	Species	Age	Sex	Repr.	Mass (g)	FA (mm)	Net	Height (m)	WDI	G/H/B/T	Band# Type____	Freq. ____
1	2140	EPFU	JV	M	NR	19.0	45	E	2.5	0	—	—	—
2	2220	LABO	A	M	NR	12.0	37	D	2.5	0	—	—	—
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
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Species Abbreviations: Corynorhinus rafinesquii (CORA); Corynorhinus t. virginianus (COVI); Eptesicus fuscus (EPFU); Lasiurus borealis (LABO); Lasiurus cinereus (LACI); Lasiurus seminolus (LASE); Lasionycteris noctivagans (LANO); Myotis austroriparius (MYAU); Myotis grisescens (MYGR); Myotis leibii (MYLE); Myotis lucifugus (MYLU); Myotis septentrionalis (MYSE); Myotis sodalis (MYSO); Nycticeius humeralis (NYHU); Perimyotis subflavus (PESU); Tadarida brasiliensis (TABR)

Other Abbreviations: Male: M; Female: F; Pregnant: P; Lactating: L; Post Lactating: PL; Scrotal: S; Non Repro: NR

Moon Phase 89 % **Wax / (Wane)**

	Rise	Set
Sun	0604	2011
Moon	2218	0949

Time	Temp (F)	Sky	Wind	No. Bats
2000	84	0	0	0
2100	75	0	0	1
2200	73	1	0	1
2300	73	1	0	0
0000	73	1	0	0
0100	72	1	0	0

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

Please Return to:
P.O. Box 73, Paint Lick, KY, 40461.
(859) 925-9012